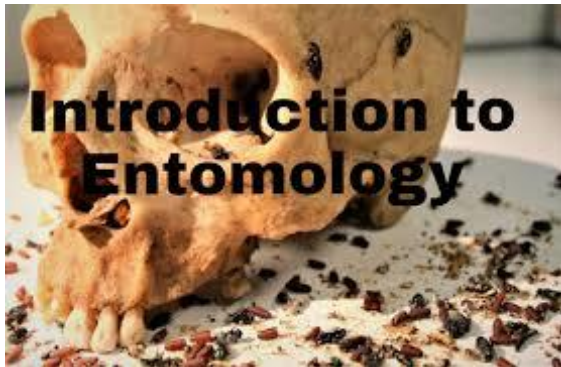


Plant protection
Elective - Forensic insects
Stage- 4th
Lecture 1
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Dr. Gazang Tahier Omar

Introduction:

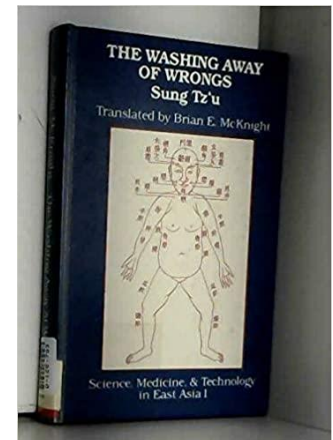
Forensic entomology is the study of insects and other arthropods that form part of the evidence in legal investigations cases, but it is mainly associated with death by providing information on when, where & how under certain condition, a crime was committed or a person/animal died.

In early stages insects are attracted to the decomposing body and may lay eggs in it. By studying the insect population and the developing larval stages, forensic scientists can estimate the postmortem interval, any change in position of the corpse as well as the cause of death.

As soon as death occurs, the body starts decomposing, insects are attracted to dead bodies by volatile chemicals that released from carrion and play an active role in the decomposing process . These insect colonizers can be used to estimate the time of death i.e., time interval between death and corpse discovery, also called postmortem index (PMI), movement of the corpse, manner and cause of death and association of suspects at the death scene .

Historical Perspective of Forensic Entomology:

First recorded incident was use of Insects in a criminal investigation in 13th-century China (described in Sung Tzu's book called The washing away of wrongs) When a farmer was found murdered in a field with a sharp weapon, all the suspects were told to place their sickles on the ground. Only one sickle attracted blow flies to the trace amount of blood hidden to the naked eye which resulted in the confession by the murderer . The first application of forensic entomology in a modern court house was in 18th-century France where entomological data was admitted as proof for acquitting the current occupants of the residence from where the skeletonized remains of a child were found.



Divisions of Forensic Entomology

1-Urban: It deals with insects that affect man and his immediate environment. The damage caused by insects feeding on flesh can cause marks and wounds on the skin that may be mistaken as abuse. Insects can also show signs of neglect and abuse, particularly in children and the elderly. Insects are also known to cause car and aircraft accidents. Stings of bees and wasps may be responsible for a large number of car accidents that lack a definitive cause. Insects also have been responsible for causing aircraft crashes through obstructed equipment,, causing engine failure. Urban pests are of great economic importance and a forensic entomologist may become involved in civil proceedings over monetary damage.

2- Stored-Product: It covers the cases arising from grains and other food contamination by insects. insects are commonly found in food (prepared or stored). A forensic entomologist may serve as an expert witness during both criminal and civil proceedings involving food contamination.

3-Medicolegal - deals with necrophagous (or carrion) feeding insects that typically infest human (and other animal) remains. This may involve murder victims—insects can be used to pinpoint exactly when the victim was killed, and therefore eliminate or accuse suspects

Role of Forensic Entomologists is

- 1) Identification of insects at various stages of their life cycle.
- 2) Collection and preservation of insects as evidence.
- 3) Determining an estimate for the post-mortem interval or PMI (the time between death and the discovery of the body) using factors such as insect evidence, weather conditions etc.
- 4) Testifying in the court to explain insect-related evidence found at a crime scene.

Factors that affects growth rate of insects are:

- 1) Temperature: Higher the temperature, faster the insect will grow and develop into an adult.
- 2) Food Quality: Eating rich, nutritious food help larvae grow faster.
- 3) Oxygen Levels: Increasing oxygen concentration increases growth rate of insects.
- 4) Day Length/Season: Many insects co-ordinate their developmental cycles with the seasons.

Factors affecting insect colonization:

- 1) Weather: when it is raining insects are less active, so colonization is slowed.
- 2) Temperature: during cold, when temperature is less, insects are less active and grow slowly.
- 3) Burial/Exposure: Even a partially buried corpse decomposes slowly; degree of exposure also affects how accessible the body is for colonization.
- 4) Location: bodies in dry environment will desiccate before insect colonization; bodies in wet places will attract a different set of insects like aquatic beetles.

A forensic entomologist must be able to:

- 1- Identifies the immature insects.
- 2- Determines the size and development of the insects.
- 3- Calculates the growth of the insects and passage through stages of the life cycle in laboratory.
- 4- Compares the growth against weather conditions to estimate time of oviposition



Ecology of Decomposition

Four categories of insects can be found on decomposing carrion:

1- Necrophages - the first species feeding on corpse tissue. Includes true flies (Diptera) and beetles (Coleoptera).

2- Omnivores - species such as ants, wasps, and some beetles that feed on both the corpse and associated maggots. Large populations of omnivores may slow the rate of corpse's decomposition by reducing populations of necrophagous species.

3-Parasites and Predators - beetles, true flies and wasps that parasitize immature flies.

4- Incidentals – spiders, mites, centipedes that use the corpse as an extension of their normal habitat.

The succession waves in which the arthropods colonize the carrion depends on the state of decomposition of the carrion .